

LISTING OF THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

Claim 1 (Currently Amended)

A substrate treatment apparatus for removing an unnecessary substance from a surface of a substrate, the apparatus comprising:

an oxidation liquid supply mechanism including an oxidation liquid nozzle for supplying an oxidation liquid having an oxidative effect to the substrate surface;

a physical cleaning mechanism including a dual fluid spray nozzle generating a jet flow of droplets of a deionized water and supplying the jet flow to the substrate surface, the dual supply fluid spray nozzle having a deionized water outlet port ejecting the deionized water towards the surface of the substrate and a gas outlet port blowing a gas onto the deionized water ejected through the deionized water outlet port, the dual fluid spray nozzle being provided separately from the oxidation liquid nozzle;

an etching liquid supply mechanism including an etching liquid nozzle for supplying an etching liquid having an etching effect to the substrate surface; and

a cleaning controller for programmed to controlling the oxidation liquid supply mechanism and the physical cleaning mechanism, to generate and supply the jet flow of droplets of the deionized water to the substrate surface from the dual fluid spray nozzle at least partly simultaneously with supplying the oxidation liquid to the substrate surface from the oxidation liquid nozzle for a period of time, so as to perform physical cleaning of the substrate surface while simultaneously supplying said oxidation liquid to the substrate surface.

Claims 2-3 (Canceled)

Claim 4 (Previously Presented)

A substrate treatment apparatus as set forth in claim 1, wherein the physical cleaning mechanism further includes an ultrasonic mechanism for imparting ultrasonic vibration to a treatment liquid supplied or to be supplied to the substrate surface.

Claim 5 (Previously Presented)

A substrate treatment apparatus as set forth in claim 1, wherein the oxidation liquid supply mechanism supplies a treatment liquid comprising ozone water as the oxidation liquid to the substrate surface from the oxidation liquid nozzle.

Claim 6 (Previously Presented)

A substrate treatment apparatus as set forth in claim 1, wherein the oxidation liquid supply mechanism supplies a treatment liquid comprising hydrogen peroxide as the oxidation liquid to the substrate surface from the oxidation liquid nozzle.

Claim 7 (Canceled)

Claim 8 (Currently Amended)

A substrate treatment method for removing an unnecessary substance from a surface of a substrate, the substrate treatment method comprising the steps of:

supplying an oxidation liquid from an oxidation liquid nozzle, the oxidation liquid having an oxidative effect to the substrate surface for oxidizing metal impurities on the substrate surface;

generating a jet flow of droplets of a deionized water by ejecting the deionized water towards the surface of the substrate through a deionized water outlet port of a dual supply fluid spray nozzle and blowing a gas through a gas outlet port of the dual supply fluid spray nozzle onto the deionized water ejected through the deionized water outlet port, the dual fluid spray nozzle being provided separately from the oxidation liquid nozzle;

physically cleaning the substrate surface by supplying the generated jet flow of droplets of the deionized water to the substrate surface from the dual supply fluid spray nozzle; and

supplying an etching liquid having an etching effect to the substrate surface for etching the substrate surface after the oxidation step and the physical cleaning step,

wherein the supplying of the generated jet flow of droplets of the deionized water from the dual supply fluid spray nozzle is carried out at least partly simultaneously with the supplying of the oxidation liquid from the oxidation liquid nozzle for a period of time, so as to perform physical cleaning of the substrate surface while simultaneously supplying said oxidation liquid to the substrate surface.

Claim 9 (Canceled)

Claim 10 (Original)

A substrate treatment method as set forth in claim 8, wherein the oxidation step, the physical cleaning step and the etching step are repeated a plurality of times.

Claim 11 (Previously Presented)

A substrate treatment method as set forth in claim 8, wherein the etching step is carried out for a period sufficient to etch away the metal impurities oxidized in the oxidation step.

Claim 12-14 (Canceled)

Claim 15 (Previously Presented)

A substrate treatment method as set forth in claim 8, wherein said oxidation liquid contains ozone water.

Claim 16 (Previously Presented)

A substrate treatment method as set forth in claim 15, wherein said oxidation liquid further contains an additive selected from the group consisting of hydrochloric acid, nitric acid and an organic acid.

Claim 17 (Previously Presented)

A substrate treatment method as set forth in claim 8, wherein said oxidation liquid contains hydrogen peroxide.

Claim 18 (Previously Presented)

A substrate treatment method as set forth in claim 17, wherein said oxidation liquid is SC-1 or SC-2.

Claim 19 (Previously Presented)

A substrate treatment method as set forth in claim 17, wherein said oxidation liquid further contains an additive selected from the group consisting of hydrochloric acid, nitric acid and an organic acid.

Claim 20 (Previously Presented)

A substrate treatment method as set forth in claim 8, wherein said etching liquid contains HF.

Claim 21 (Previously Presented)

A substrate treatment method as set forth in claim 20, wherein said etching liquid further contains HCl or H₂O₂.

Claim 22 (Previously Presented)

A substrate treatment method as set forth in claim 8, wherein said etching liquid contains NH₄OH or SC-1.

Claim 23-24 (Canceled)